

REMARKS

Claims 12-22 are pending in the application, and new claim 23 is presented for examination. Claims 12, 13, 21, and 22 have been amended. This Amendment responsive to, and timely filed within the three-month shortened statutory period set forth in the Office Action dated August 26, 2004.

Objections to the Drawings

Responsive to the objections set forth at pages 2 and 3 of the Office Action, the drawings have been amended to delete the reference numbers 52 (Fig. 5) and 72, 74, 78, and 82 (Fig. 7c-7d). In addition, Figures 23a and 23b have been amended to include reference numbers corresponding to page 33 of the specification. Withdrawal of the objection to the drawings is therefore respectfully requested.

Objections to the Specification

The Examiner is thanked for the careful review of the specification. The typographical errors identified in the office action are corrected in the Amendments to the Specification section that begins on page 2 of this Amendment. A replacement Abstract is provided to correct the typographical error identified in the Office Action. A few other minor informalities in the Specification have also been addressed.

Information Disclosure Statement

Page 4 of the Office Action requests that an IDS be filed and that copies of the documents cited at pages 1, 15, 21, and 22 be provided to the Examiner. Because these documents were listed on a PTO-1449 and previously submitted in the parent application, it is believed that the documents should be considered by the Examiner without any need for

submission of an IDS or additional copies of the documents. See MPEP 609 I(A)(2).

However, for the Examiner's convenience, Applicants are enclosing copies of the requested documents that were previously submitted in the parent application.

Rejections under 35 U.S.C. § 112, second paragraph

Page 4 of the Office Action set forth a rejection of Claim 21 as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Claim 21 has been amended to address the antecedent basis issue pointed out in the Office Action, and not for any purpose of distinguishing over any prior art or changing the claim scope. Claim 22 has also been amended to address minor grammatical informalities, and not for any purpose of distinguishing over any prior art of changing the claim scope. Withdrawal of the rejection of claim 21 under 35 U.S.C. § 112, second paragraph, is respectfully requested.

Rejections under 35 U.S.C. § 101, Statutory Double Patenting

Page 5 of the Office Action set forth a rejection of claims 21 and 22 under 35 U.S.C. § 101, as claiming the same invention as that in claim 1 of U.S. Patent No. 6,724,916 to Shyu. Applicants respectfully request reconsideration of this rejection.

According to MPEP 804(II)(A), a rejection under this section of the patent statute is proper only if the identical subject matter is claimed. Also see *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957). This is not the case for either claims 21 and 22, when compared to claim 1 of U.S. Patent No. 6,724,916. For example, claim 1 of the U.S. Patent No. 6,724,916 is directed to a computer system that includes "a plurality of arrays of

sensors for receiving signals from a target” and “a receiver for receiving signals received by the plurality of sensor arrays”. Neither Claims 21 and 22 of the present application includes these elements. Accordingly, the subject matters of present claim 21 and claim 22 are not the same as claim 1 of U.S. Patent No. 6,724,916. Withdrawal of the rejection of Claims 21 and 22 under 35 U.S.C. § 101 is therefore respectfully requested.

Rejections under the Judicially Created Doctrine of Double Patenting

Page 8 of the Office Action set forth a rejection of claims 12-20 under the judicially created doctrine of obviousness-type double patenting. Kindly find enclosed a Terminal Disclaimer signed by an attorney of record in the application. Withdrawal of this rejection is therefore respectfully requested.

Rejections under 35 U.S.C. § 103(a)

Page 12 of the Office Action sets forth a rejection of independent Claims 12 and 13, and dependent claims 13, 15-16, and 19-20 under 35 U.S.C. § 103(a) as being obvious based on a hypothetical combination of the disclosures of U.S. Patent No. 5,892,855 to Kakinami et al. in combination with Yankowich et al. “A Hough Transform Based Multisensor, Multitarget Track Initiation Technique”, Proceedings of the 36th IEEE Conference on Decision and Control 1997, pages 5018-23. Applicants respectfully request reconsideration of this rejection.

Claim 12 is directed to a system for tracking multiple targets using distributed linear sensor arrays, comprising: a plurality of arrays of sensors for receiving signals from a target; a receiver for receiving signals received by the plurality of sensor arrays; an analog/digital converter for converting the signals received from the sensor arrays to a digital format, if

signals are received in an analog format; a digital storage device for storing the digitized data from the sensor arrays; and a computer system retrieving the stored digitized data from the plurality of sensor arrays and processing the data through the use of a composite Hough transform to determine a track of the target.

Initially, it is noted that Kakinami et al. and Yankowich et al. are directed to very different systems. Kakinami et al. is concerned with automobile mounted three-television-camera system that steers the cameras so that an object in the road ahead will appear in all three cameras. Yankowich et al. is directed to a detect-on-track algorithm based on a Hough transform applied to a narrowband beamformed output of an acoustic sensor, such as would be used in an oceanographic environment. See page 1313, first paragraph.

The Office Action asserts that one of ordinary skill in the art would have been motivated to modify the Yankowich algorithm to include Kakinami et al.'s multiple camera-system, analog to digital converter, and image processor 100 Kakinami et al., however, does not provide any basis for the assertion that one would have made such a modification. Applicants respectfully submit that the mere assertion that Kakinami et al. discloses multiple cameras and that Yankowich et al. discloses that multiple (acoustic) sensors can be used to track objects, is insufficient to support a prima facie case of obviousness.

It is respectfully submitted there is no guidance in either Kakinami et al. or Yankowich et al. for using a composite Hough transform to process television image data, much less image data from three automobile mounted television cameras. Neither Yankowich et al. nor Kakinami et al. provides any reason to believe that the camera data in

Kakinami et al. would lend itself to a Hough transform, or that if the images could be so transformed, any target tracking would result.

Applicants note that the page 2 of the Office Action notes that the language of claims 12 and 13 (a computer for...) recite the use of a composite Hough transform as an intended use. Claims 12 and 13 have been amended to positively recite the actions “retrieving retrieving the stored digitized data from the plurality of sensor arrays and processing the data through the use of a composite Hough transform to determine a track of the target”.

For at least these reasons, Claim 12 is believed to be allowable over the combination of Kakinami et al. and Yankowich et al.

Claim 13 is believed to be allowable over a hypothetical combination of Kakinami et al. and Yankowich et al. for at least the same reasons that Claim 12 is allowable.

Dependent claims 13, 15-16, and 19-20 are believed to be allowable over Kakinami et al. and Yankowich et al. for at least the same reason that Claims 12 and 13 are allowable. Nonetheless, a few comments regarding dependent Claim 19 are provided to expedite prosecution.

With respect to the rejection of Claim 19 set forth at page 13 of the Office Action, the Office Action does not identify any features in either Kakinami et al. or Yankowich et al. that correspond to the claimed feature that “the means for converting the signals received from the sensor arrays to a digital format, if required, is an analog-to-digital converter”, nor any reason why the claimed combination of features would have been obvious to one of ordinary skill in the art. The Office Action at page 13 says only that “the means for converting the signals received from the sensor arrays to a digital format corresponds to claim 12iii”. This

statement is not entirely clear, as neither Kakinami et al. nor Yankowich et al. includes a claim 12iii. Accordingly, a prima facie case of obviousness has not been established for Claim 19.

Dependent claims 14, 17, and 18 are allowable for at least the same reasons that Claim 12 is allowable. U.S. Patent No. 5,798,458 to Monroe and U.S. Patent No. 5,838,816 to Holmberg fail to remedy the above-mentioned deficiencies of Yankowich et al. and Kakinami et al.

Page 15 of the Office Action sets forth a rejection of independent Claims 21 and 22 under 35 U.S.C. § 103(a) as being obvious based on a hypothetical combination of the disclosures of Shyu, H. "Applying Morphological Filters to Acoustic Broadband Correlograms", 1997, and U.S. Patent No. 5,892,855 to Kakinami et al. Applicants respectfully request reconsideration of this rejection.

Shyu "Applying Morphological Filters" discusses the use of an acoustic broadband correlogram for tracking targets such as ships for data collected with underwater acoustic systems such as SONAR receivers. Kakinami et al.'s device is directed to a automobile-mounted three-camera system that steers the cameras so that an object detected with the wide angle camera also is detected by the narrow angle cameras. Kakinami et al. does not use acoustic sensors or correlograms, much less acoustic broadband correlograms. Kakinami et al. instead has three television cameras mounted on a moving automobile, and is concerned with steering the cameras to ensure that an object seen in one of the camera views is also seen in the other camera views.

The Office Action has not set forth any basis for asserting that one of ordinary skill in the art would have been motivated to combine the Shyu “Applying Morphological Filters” and Kakinami disclosures. The Office Action says only that “it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the multiple sensor system suggested by Kakinami et al. as Shyu explains that data from multiple sensors may be used to detect object [sic] close to the sensor system”. Applicants respectfully submit that this statement is insufficient to support a prima facie case of obviousness. As discussed above, the systems of Kakinami et al. and Shyu “Applying Morphological Filters” are very different. Nothing in Kakinami et al. provides any guidance for processing data associated with the acoustic correlograms of Shyu “Applying Morphological Filters”. Nor does Shyu “Applying Morphological Filters” provide any guidance on modifying the television camera steering system of Kakinami et al.

Moreover, even if the Kakinami et al. and Shyu “Applying Morphological Filters” disclosures were combined in the manner proposed by the Office Action, the hypothetical combination of references would not have all the features set forth in Claim 21.

First, and as acknowledged by the Office Action, Shyu does not disclose “a computer for retrieving data from the data storage device, computing a hypothesis reference track relative to a primary sensor array, and for computing a hypothesis reference track relative to a second sensor array; said computer calculating an associated delay curve in a primary correlogram for the primary sensor array, said computer calculating an associated delay curve in a secondary correlogram for a secondary array, said computer accumulating data for the reference track by simultaneously integrating a series of pixel values along the appropriate

delay curve in the primary and secondary correlograms; said computer storing the accumulated pixel values in composite Hough space and thresholding the accumulated pixel values to detect the track”. The Office Action asserts that Kakinami et al. discloses a CPU. Applicants respectfully note that nothing in Kakinami et al. indicates that the CPU could perform the claimed functions of computing a hypothesis reference track relative to a primary sensor array and computing a hypothesis reference track relative to a second sensor array, calculating an associated delay curve in a primary correlogram for the primary sensor array, said computer calculating an associated delay curve in a secondary correlogram for a secondary array, accumulating data for the reference track by simultaneously integrating a series of pixel values along the appropriate delay curve in the primary and secondary correlograms, storing the accumulated pixel values in composite Hough space and thresholding the accumulated pixel values to detect the track. Thus, the CPU of Kakinami et al. cannot be considered to correspond to the computer set forth in Claim 21.

Next, and also acknowledged by the Office Action, there is no disclosure in Shyu “Applying Morphological Filters” of the feature of a computer “accumulating data for the reference track by simultaneously integrating a series of pixel values along the appropriate delay curve in the primary and secondary correlograms”. Although the Office Action asserts that this feature is disclosed in Shyu at page 4183, col. 2, paragraph 2, a reading of this section of Shyu “Applying Morphological Filters” finds no disclosure of “simultaneously integrating a series of pixel values along the appropriate delay curve in the primary and secondary correlograms.” Nor does Kakinami et al. cure this deficiency.

Moreover, Claim 21 also sets forth that the computer calculates an associated delay curve in a primary correlogram for the primary sensor array and calculates an associated delay curve in a secondary correlogram for a secondary array. Neither Shyu "Applying Morphological Filters" nor Kakinami et al. discloses a computer computing a hypothesis reference track relative to a primary sensor array and hypothesis reference track relative to a secondary array. In addressing this feature, page 16, para iv of the Office Action asserts that "calculating an associated delay in a secondary correlogram for the secondary array corresponds to claim 21iii...". This statement is not entirely clear, as Shyu "Applying Morphological Filters" has no claims and Kakinami et al does not include a claim 21iii. Thus, the Office Action has not identified any feature in Shyu "Applying Morphological Filters" or Kakinami et al. that corresponds to this portion of Claim 21.

For at least these reasons, it is respectfully submitted that a prima facie case of obviousness has not been established with respect to Claim 21.

Independent Claim 22 is directed to a computer system for processing digitized data to determine the track of a target comprising: a data storage device; and a computer for retrieving data from the data storage device and hypothesizing a track with track parameters values (θ_1, v, D, t_{01}) , generating a corresponding template delay curve in a primary correlogram, performing integration along the template delay curve in the primary correlogram, computing a delay curve parameter $(\theta_2, v/D, t_{02})$ for a secondary array based on geometric constraints, generating a corresponding template delay curve in a secondary correlogram based on the delay curve parameter $(\theta_2, v/D, t_{02})$, performing integration along

the template delay curve in the secondary correlogram and storing integrated values in the composite Hough space, and thresholding the accumulated pixel values to detect the track.

It is respectfully submitted that neither Shyu “Applying Morphological Filters” nor Kakinami et al. discloses the features of the computer “computing a delay curve parameter (θ_2 , v/D , t_{02}) for a secondary array based on geometric constraints; generating a corresponding template delay curve in a secondary correlogram based on the delay curve parameter (θ_2 , v/D , t_{02}); performing integration along the template delay curve in the secondary correlogram and storing integrated values in the composite Hough space”, as set forth in Claim 22.

With respect to the feature of “computing a delay curve parameter (θ_2 , v/D , t_{02}) for a secondary array based on geometric constraints”, the Office Action at page 17, para v. acknowledges that the claimed feature of computing a delay parameter (θ_2 , v/D , t_{02}) for a secondary array based on geometrical constraints is not disclosed in Shyu “Applying Morphological Filters”, however, asserts that such a step “can be applied to a second sensor”. However, whether a particular modification can be made, however, is not a proper test for obviousness. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Here, no such showing has been made.

In addition, with respect to the feature of “performing integration along the template curve in the secondary correlogram and storing integrated values in the composite Hough space”, the Office Action at page 17, para vii. asserts that this feature “corresponds to claim

21v". This comment is not entirely clear, as neither Shyu "Applying Morphological Filters" nor Kakinami et al. includes a claim 21v. Thus, the Office Action has not identified any feature in Shyu "Applying Morphological Filters" or Kakinami et al. that corresponds to this portion of Claim 22.

For at least these reasons, a prima facie case of obviousness has not been established with respect to Claim 22.

New Claims

New claim 23 is presented to set forth additional subject matter to which the applicants are believed to be entitled.

Conclusion

The Application is believed to be in condition for allowance. An early indication of the allowability of the application is respectfully solicited. Should Examiner Akhavannik believe that a telephone interview would be helpful in resolving any issues regarding this Amendment or the application in general, he is cordially invited to contact the undersigned at the telephone number listed below.

Respectfully Submitted,


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AMENDMENTS TO THE DRAWINGS

Please replace the sheets including Figures 5, 7c, 7d, 23a and 23b with the replacement sheets including Figures 5, 7c, 7d, 23a and 23b shown in the attachment following page 23 of this paper. These drawings are submitted to place the application in better form by making the minor corrections suggested by the Examiner.

In addition, Figures 23a and 23b have been amended to include reference numerals 282, 284, 286, 288, and 290 to better correspond to the text at page 33.